

### REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated December 28, 2006. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

### Status of the Claims

As outlined above, claims 1, 3-5 and 7-19 stand for consideration in this application, wherein claim 1 is being amended to correct formal errors and to more particularly point out and distinctly claim the subject invention. New claim 19 is being submitted for consideration. In addition, the specification is being amended to correct various formal errors and to better disclose the present invention as claimed. All amendments to the application are fully supported therein. Applicant hereby submits that no new matter is being introduced into the application through the submission of this response.

### Prior Art Rejections

The Examiner rejected claims 1, 3-5, 7-8, 14 and 18 under 35 U.S.C. § 103(a) as being unpatentable over US Application No. 2002/0024153 A1 to Yoshida et al. in view of two newly cited references US Patent No. 6,452,215 to Sato and an article entitled "Asymmetric Multiple-Quantum-Well Heterostructures" by Kononenko.

The Examiner also rejected claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Yoshida '153, Sato '215 and Kononenko in view of US Patent No. 5,354,707 to Chapple-Sokol et al., claim 15 as being unpatentable over Yoshida '153, Sato '215 and Kononenko in view of US Patent No. 6,394,655 to Hayashi, claim 16 as being unpatentable over Yoshida '153, Sato '215 and Kononenko in view of US Patent No. 6,741,538 B2 to Momoo et al, and claim 17 as being unpatentable over Yoshida '153, Sato '215 and Kononenko in view of US Patent No. 5,625,729 to Brown. Applicant has reviewed the above-outlined prior art rejections, and hereby respectfully traverse.

The present invention as now recited in claim 1 is directed to an optical head that comprises a light source for emitting a light beam, a lens for focusing the light beam onto a medium, and a detector for detecting a reflected light beam from the medium, wherein the light source comprises a semiconductor laser comprising an active layer and a barrier layer, said active layer being formed of an indirect semiconductor in an asymmetric quantum well

structure in which a conduction band and a valence band are asymmetric with respect to a center of the quantum well structure in a band structure pattern.

One of the features of the present invention is the combination of the indirect semiconductor and the asymmetric quantum well structure (see for example Figures 3, 4 and 6 and their corresponding descriptions in the specification of the present application) with which a low coherent light source can be realized. That is, this coherent light source can reduce laser interference (variations in light quantity) of the optical head. Applicant has found that in an InAlGaP group substance, whether the semiconductor is indirect or not is depends upon the mixing ratio (composition) thereof. Also, Applicant has found that an indirect semiconductor having an asymmetric quantum well structure enables light emission with an emission spectrum whose main peak has a half-width value in a relatively wide range (see the appended diagram labeled APPENDIX II).

In the Office Action, Yoshida was cited for disclosing an optical head characterized by a light source formed of an indirect semiconductor laser, a lens for focusing a light beam from the light source onto a medium, and a detector for detecting a reflected light beam from the medium except that Yoshida does not disclose that the laser contains a barrier layer and the semiconductor layer contains quantum wells. Further, in the Office Action, the Examiner pointed out that Yoshida in fact disclosed a laser source formed of an indirect semiconductor. However, Applicant respectfully contends that Yoshida in actuality neither discloses nor suggests the use of the indirect semiconductor. Even more, Yoshida does not concern laser emission, but rather LED emission (see for example paragraphs [0007], [0009]-[0010], [0034]-[0040]).

With respect to the secondary reference of Sato, the Examiner asserted that this reference discloses an active layer and a cladding layer which are formed of indirect semiconductors (see Abstract). However, these layers are not formed of the indirect semiconductor but of direct semiconductors. Rather, the quantum well structure disclosed in Sato is composed of a cladding layer (corresponding to the barrier layer) formed of  $(\text{Al}_{0.7}\text{Ga}_{0.3})_{0.51}\text{In}_{0.49}\text{P}$  in which the In composition is in a range of 0.49 to 0.51, and an active layer formed of  $(\text{Al}_{0.2}\text{Ga}_{0.8})_{0.49}\text{In}_{0.51}\text{N}_{0.01}\text{P}_{0.99}$  (substantially the same as  $(\text{Al}_{0.2}\text{Ga}_{0.8})_{0.49}\text{In}_{0.51}\text{P}$ ). This composition means that both the cladding layer and the active layer are both direct semiconductor layers (refer to the Appended Drawing marked Sketch I attached hereto). Accordingly, both cladding layer and active layer cannot and are not formed from indirect semiconductor layers. Consequently, Sato fails to disclose, teach or suggest indirect semiconductor structures.

The secondary reference of Kononenko was cited for allegedly disclosing multiple quantum wells having different widths and different depths. Although Kononenko calls those structures multiple quantum wells as an asymmetric type since the widths and the depths of the quantum wells are different from one another as viewed in their entirety, Applicant will point out that each pair of the quantum well layers has a symmetric structure (refer to the Appended Drawing marked Sketch II attached thereto, or Figures 3 and 5 of Kononenko).

The present invention, on the other hand, comprises each single pair of quantum well layers having an asymmetric structure (refer to the Appended Drawing marked Sketch III, or Figure 6 in the present application). Thus, Kononenko in fact does not show or suggest quantum well structures even remotely similar to those of the present invention.

As a result, Applicant will strongly but respectfully contend that the neither Yoshida, Sato, Kononenko nor their combination can render obvious each and every feature of the present invention, nor even the combination of features of the present invention. Instead, each reference as shown above embodies deficiencies that cannot be cured by the other references. In particular, because of the disparities in their teachings, Applicant will contend that there is no teaching or suggestion in any of the above-noted references that would motivate their combination in a manner so as to embody all the features of the present invention. Rather, Applicant will again contend that the only motivation for combining their teachings is the Examiner's firsthand knowledge of the present invention's disclosure.

Applicant will respectfully contend that the Examiner fails to establish a prima facie case of obviousness by properly bridging the proposed modification of the references necessary to arrive at the claimed subject matter (see MPEP §706.02(j)). It is well established that the Examiner is not allowed to select bits and pieces from each reference, and then combining those bits and pieces using knowledge or hindsight gleaned from the disclosure of the present invention as a guide to support the combination. Rather, each prior art reference must be evaluated as an entirety, and all of the prior art must be considered as a whole," *Panduit Corp. v. Dennison Mfg. Co.*, 227 USPQ 337, 344 (Fed. Cir. 1985). See *Para-Ordinance Mfg. Inc. v. SGS Importers Intl., Inc.*, 73 F.3d 1085, 37 USPQ2d 1237 (Fed. Cir. 1995) ("Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor."). In this case, the Examiner is using his hindsight knowledge of the claimed invention to read elements from each of the references without a clear showing of any motivation to combine the references.

It is well established that, to reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, [one] must provide some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct. A suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. See *In re Leonard R. Kahn*, 441 F.3d 977, 78 USPQ2d 1329 (Fed. Cir. 2006), citing *In re Kotzab*, 217 F.3d 1365, 1370 (Fed.Cir. 2000).

In this case, Applicant has pointed out that the references are each directed to subject matter not related to the present invention or lacking in subject matter relating to the present invention. As such, Applicant will contend that there can be no motivation to combine such references absent firsthand knowledge of the present invention. Consequently, the present invention as a whole is distinguishable and thereby allowable over at least Yoshida, Sato and Kononenko.

As to the remaining cited tertiary references, all these references are only cited for showing features from dependent claims. None of these references provides any disclosure, teaching or suggestion that makes up for the deficiencies in the first three references, and thus these references by themselves fall far short of rendering obvious any of the features or the combination of features of the present invention. The present invention as a whole is distinguishable and thereby allowable over all the prior art cited.

#### Allowable Subject Matter

Applicant again thanks the Examiner for holding that claims 9, 10, 12, and 13 would be allowed if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant acknowledges the Examiner's statement of reasons for allowance as set forth in the Office Action. However, Applicant will point out that the reasons for allowability of the above referenced claims are not limited to the reasons for allowance as set forth in the Office Action.

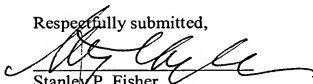
As to dependent claims 9, 10, 12, and 13, the arguments set forth above with respect to independent claim 1 are equally applicable here. The base claim being allowable, claims 9, 10, 12, and 13 must also be allowable in the form of a dependent claim.

Conclusion

In view of all the above, Applicant respectfully submits that certain clear and distinct differences as discussed exist between the present invention as now claimed and the prior art references upon which the rejections in the Office Action rely. These differences are more than sufficient that the present invention as now claimed would not have been anticipated nor rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application as amended is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicant's undersigned representative at the address and phone number indicated below.

Respectfully submitted,



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